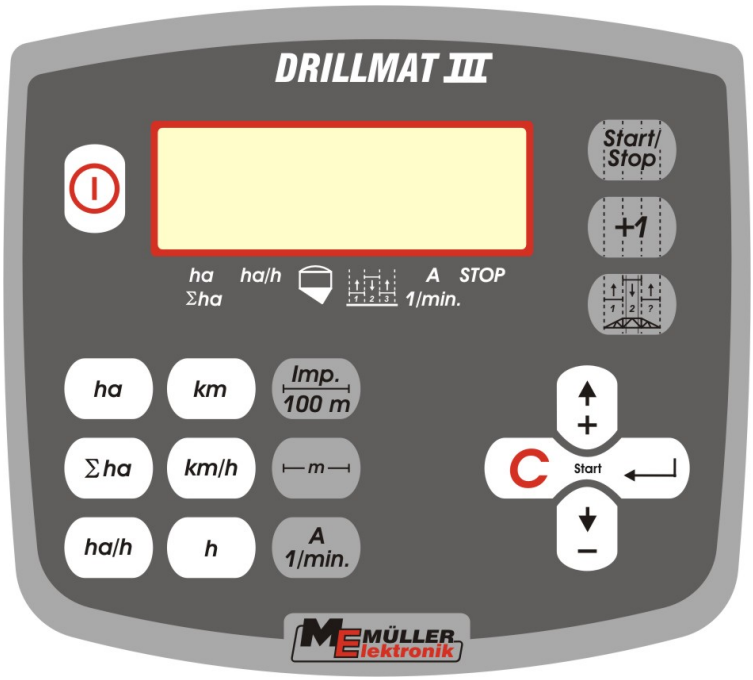
# Installation and Operating Instructions

## *Drillmat III*

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Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

# Imprint

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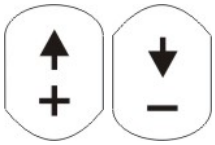
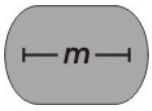
4.2.1 Setting keys +/-  ..... 11
4.2.2 "Working width" key  ..... 11
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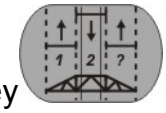
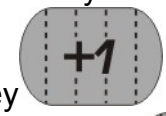
4.2.5 "Tram line rhythm" key  ..... 13
4.2.6 "+1" key  ..... 15
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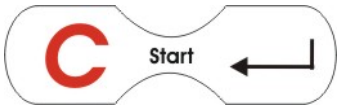
4.3.2 "Start function"  ..... 16

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# 1 SYSTEM DESCRIPTION

The drillmat is used to monitor the seed drill, to determine the working data and for tram line switching.

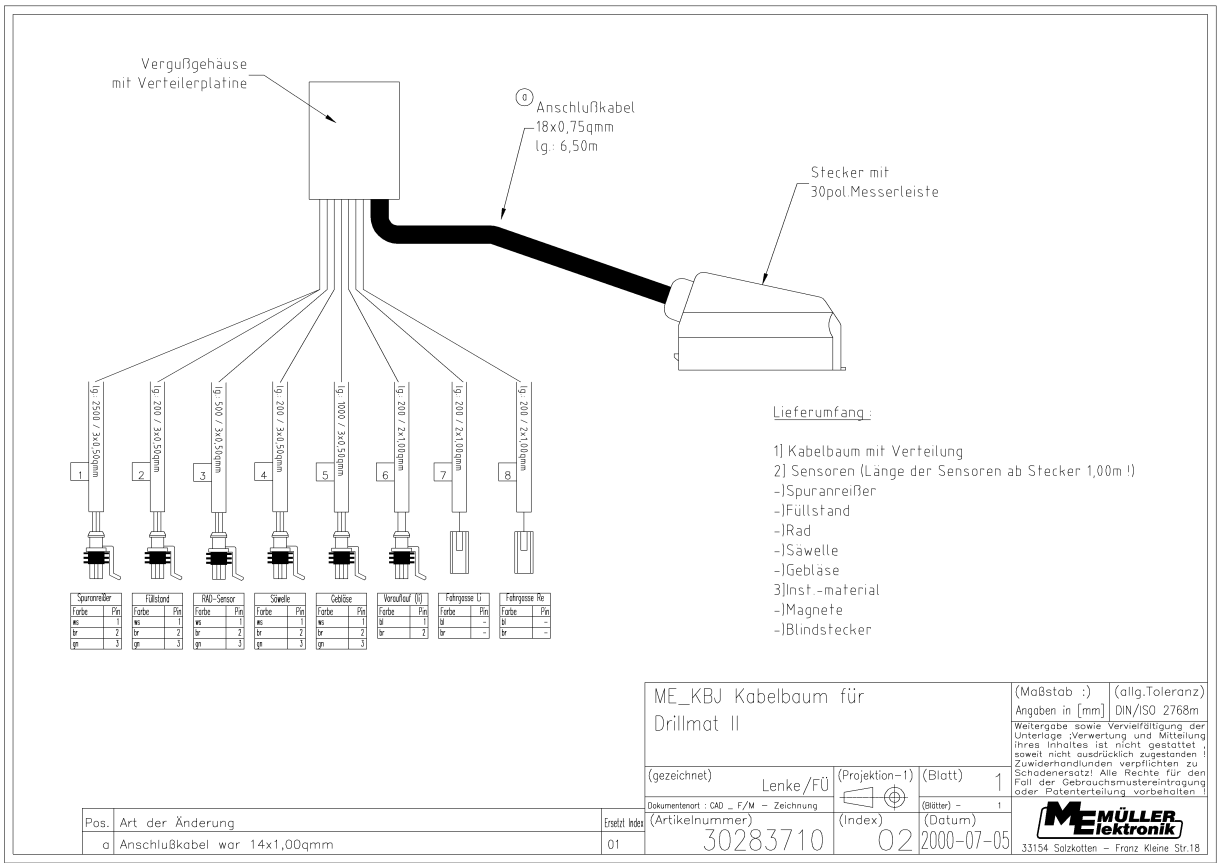
Basically the drillmat consists of:

- the board computer (installed in the cabin of the tractor) for the entry of the data required. It also serves as a monitor. In the case of a fault, an acoustic and optical alarm is set off.

- the machine wire harness (installed on the seed drill) with a connecting cable to the board computer.

With wheel sensor
Sensor for monitoring sowing
Sensor for monitoring the fan
Level sensor
Row marker

## 1.1 Wire harness



## 1.2 Computer and basic equipment

# 2 Safety instructions

## 2.1 Disclaimer

**The *Drillmat III* is specified exclusively for agricultural use. The manufacturer takes no responsibility for any installation or application outwith this area.**

**The manufacturer does not accept liability for damage to persons or property resulting from unspecified use. In such cases all risks are the responsibility of the user.**

**Specified implementation also includes adhering to the operation and maintenance requirements stipulated by the manufacturer.**

**Relevant accident prevention regulations as well as other generally recognised safety, industrial, health and road traffic rules are to be adhered to. In addition the manufacturer accepts no liability in cases where arbitrary modifications have been made to the device.**

## 2.2 Safety measures

Warning!

**Always pay attention to this symbol for references to important safety precautions.**
**It means attention! Become alert!**
**It is a question of your safety.**

**Read the user's guide before using the DRILLMAT III for the first time.**

Observe the following recommended precautions and safety instructions:

- Before using the *Drillmat III,* read and understand this guide. It is of equal importance that other operators also read and understand the manual.
- During maintenance or when using a battery charger, switch off the power supply.
- Never service or repair the device when it is switched on.
- Unauthorised opening of the device leads to the loss of any warranty claims.
- When welding on the tractor or on an attached machine, interrupt the power supply to the *Drillmat III*.
- Only use a cloth with clear water or a little glass cleaning agent to clean the *Drillmat III*
- Operate the keys with your finger tips but avoid using finger nails.
- Should any part of this guide remain incomprehensible after reading, contact your dealer or Mueller-Elektronik Service for further clarification before using the *Drillmat III*
- Read carefully and observe all safety instructions in the manual.
- Learn how to operate the *Drillmat III* correctly. Do not allow anyone to operate the machine without exact instructions.
- Keep the *Drillmat III* and the spare parts in good condition. Unstipulated alterations or operation can impair the function and/or safety and affect the life span of the machine.
- Pay attention to **the Safety notice for the subsequent installation of electrical and electronic devices and/or components** in chapter 7 page 20 and the **EC Declaration of Conformity** chapter 7.2 page 20 in the appendix of these instructions.

# 3 Installation instructions - Drillmat

## 3.1 Computer

The computer is to be installed together with the console within the driver's field of visibility. The distance from the radio equipment or radio antenna should be at least 1 meter.

## 3.2 12V socket connection to the tractor battery

For the Drillmat's current supply (computer and sensors) the 12V socket supplied is to be connected to the tractor battery. No second device should be connected to this 12V socket. The 12V socket must be protected by a 25A safety fuse, which is to be found in the wire connector to the brown 12 V wire.

Wire colours:

brown = + 12 Volt
blue = ground

The battery's negative pole must always be at ground (frame, chassis).

## 3.3 Wire harness

The wire harness and the sensors are factory installed.

## 3.4 Sensors

**- Wheel sensor (Hall element)**

The wheel sensor is used to determine the distance covered as well as the area.

The tube clip and magnet are mounted on to the wheel. The red side must point towards the sensor. The sensor is to be mounted to the magnets on the fixture provided at a distance of 5-10mm. A connector is provided for each lead in the wire harness.

**- Drill shaft sensor (Reed contact)**
This sensor monitors the function of the drill shaft.

The tube clip and magnet are mounted on to the drill shaft. The red side must point towards the sensor. The sensor must be mounted to the fixture provided at a distance of approximately 20 mm.

**- Level sensor (capacitive)**
This sensor controls the seed bin.
As soon as the surface is no longer covered with grain, the sensor switches on and the computer sends out an alarm signal.

The sensor should be placed in the seed bin, so that it switches on as soon as the set amount of residue is reached. The end of the sensor should protrude 20 mm from the screw fitting.

The sensitivity can be regulated at the back of the sensor. If the sensor switches on, the lamp on the sensor lights up.

**- Row marker sensor (Reed contact)**
This sensor indicates to the computer that the row markers have been switched.

The sensor is to be mounted on to a static fixture opposite the switch mechanism for the row marker. The magnet is to be mounted on to the switch mechanism opposite the sensor at a distance of 20 mm. The magnet must momentarily be lead past the sensor when the row indicator switches. Its end position should not be in front of the sensor.

The tram line meter moves on one position each time the row marker switches on.

**- Seed drill without track marker**
The switch impulse is picked up when the top link is raised. The magnet and sensor should be mounted so that they approach each other in a raised position at roughly 20 mm.

In working position the distance must be at least 40 mm.

**- Fan sensor (Hall element)**
**Rpm monitor on the fan**
Both magnets are to be mounted to the fixture provided. The red side must point towards the sensor. The sensor must be mounted at a distance of 5-10 mm to the sensors.

# 4 Operating instructions

## 4.1 Initial operation

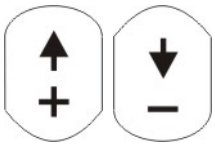
The device carries out a self-test when switched on. After completion the function last used before switch-off is automatically selected.

In the case of an electronic fault the device displays:
HALP 00 or HALP 88.
In this case return the device for repair.

## 4.2 Description of the entry keys

The keyboard has two colours:

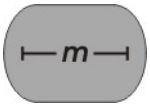
White keys = function keys (display the recorded data)
Grey keys = entry keys (enter the machine data) and control keys

### 4.2.1 Setting keys +/- 

When the keys or are pressed the display moves one position in the direction required.

Each time the key is pressed, the display moves on until the key is released.

The board computer requires the following machine data in order to operate at all: Impulses/100m, working width, drill shaft rpm and the tram line rhythm.

### 4.2.2 "Working width" key 

This key is used to enter the actual working width:

- Press
- Select value using the keys and
- Press

Finally control the value entered once more by pressing the "working width" key.

## 4.2.3 "Impulses/100m" key


With this key the number of impulses recorded to the computer by the wheel sensor during a journey of 100 m is entered.

There are two possibilities to enter the data:

1. The impulse/100 m value is known
   - Press
   - Enter number of impulses with and keys.
   - Press

2. The impulse/100 m value is not known
   - Measure out and mark a distance of100 m on the field
   - Bring the vehicle in to start position
   - Press and simultaneously
   - Travel a distance of 100 m
   - Press

## 4.2.4 "RPM" key


With the initial operation the fan's rated rpm must be communicated to the computer.

Enter as follows:
- Start up the machine
- Press
  (current rpm will be displayed).
- Press

The value displayed at this moment in time is saved as the rated rpm.

If monitoring is to be switched off, the following entry is required:

- Press (display 0)
- Press
- Rpm monitoring is now switched off

The rpm alarm is displayed by a hooting sound and the flashing of the arrow above the rpm display every second. With the drill shaft alarm this occurs every 5 seconds.

## 4.2.5 "Tram line rhythm" key

Tram lines can be laid out automatically using the Drillmat. For this purpose the corresponding share must be closed. The working widths of the seed drill and the cultivator have to be taken into account. The tram line rhythm is calculated on the basis of these values.

$$\text{Tram line rhythm} = \frac{\text{Working width of the cultivator}}{\text{Working width of the seed drill}}$$

**Example:** You are using a field sprayer with a working width of 24 m and a seed drill with a working width of 6 m. In this case the tram line rhythm is 24:6 = 4.

The calculation results in even (2, 4, 6 etc.) and uneven (1, 3, 5 etc.) rhythms. In the case of even rhythms, the tram lines are usually laid out in 2 runs. As this tends to be more inaccurate, the even rhythms can be laid out in one run (S rhythms e.g. 4S; 6S etc.). However, it has to be taken into consideration that the first run is carried out with half the working width of the seed drill and subsequently begins with position 1 of the rhythm.

Using standard rhythms you can also choose if only the inside, the outside or all tram line shares should shut off. This allows you to adjust to working with a tram line width of e.g. 1.50 m or 1.80 m or with broad tyres.

This is not possible when using double tram line rhythms. In this case you can only choose between beginning at the left hand boundary or the right hand boundary of the field.

Following rhythms are supported by the Drillmat:

| Rhythm no. read out | Rhythm | Tram line left | Tram line right |
|---|---|---|---|
| 0 : | No tram line | 0 | 0 |
| - 2 : | 2 | 1.2 | 0 |
| 2 - : | 2 | 0 | 1.2 |
| 2 A: | 2 | 1.2 | 1.2 |
| 3 : | 3 | 2 | 2 |
| - 4 : | 4 | 2.3 | 0 |
| 4 - : | 4 | 0 | 2.3 |
| 4 A: | 4 | 2.3 | 2.3 |
| 5 : | 5 | 3 | 3 |
| - 6 : | 6 | 3.4 | 0 |
| 6 - : | 6 | 0 | 3.4 |
| 6 A: | 6 | 3.4 | 3.4 |
| 7 : | 7 | 4 | 4 |
| - 8 : | 8 | 4.5 | 0 |
| 8 - : | 8 | 0 | 4.5 |
| 8 A: | 8 | 4.5 | 4.5 |

| Rhythm no. read out | Rhythm | Tram line left | Tram line right |
|---|---|---|---|
| 9 : | 9 | 5 | 5 |
| - 10 : | 10 | 5.6 | 0 |
| 10 - : | 10 | 0 | 5.6 |
| 10 A: | 10 | 5.6 | 5.6 |
| 11 : | 11 | 6 | 6 |
| - 12 : | 12 | 6.7 | 0 |
| 12 - : | 12 | 0 | 6.7 |
| 12 A: | 12 | 6.7 | 6.7 |
| - 14 : | 14 | 7.8 | 0 |
| 14 - : | 14 | 0 | 7.8 |
| 14 A: | 14 | 7.8 | 7.8 |
| 15 : | 10 (20m/8m, 15m/6m) beginning on the right | 2.9 | 4.7 |
| 16 : | 10 (20m/8m, 15m/6m) beginning on the left | 4.7 | 2.9 |
| 18 : | 18 (18m/4m) beginning on the left | 3.16 | 7.12 |
| 19 : | 18 (18m/4m) beginning on the left | 7.12 | 3.16 |
| 20 : | 10 (20m/6m) beginning on the left | 2.9 | 5.6 |
| 21 : | 10 (20m/6m) beginning on the right | 5.6 | 2.9 |
| 22 : | 6 (18m/12m) beginning on the left | 3.4 | 1.6 |
| 23 : | 6 (18m/12m) beginning on the right | 1.6 | 3.4 |
| 24 : | 16 (24m/4.5m) beginning on the left | 8.9 | 3.14 |
| 25 : | 16 (24m/4.5m) beginning on the right | 3.14 | 8.9 |
| 26 : | 18 (27m/6m) beginning on the left | 3.16 | 7.12 |
| 27 : | 18 (27m/6m) beginning on the right | 7.12 | 3.16 |
| 28 : | 14 (28m/8m) beginning on the left | 2.13 | 6.9 |
| 29 : | 14 (28m/8m) beginning on the right | 6.9 | 2.13 |
| 2-S: | 2 symmetrical | 1 | 1 |
| 4-S: | 4 symmetrical | 2 | 2 |
| 6-S: | 6 symmetrical | 3 | 3 |
| 8-S: | 8 symmetrical | 4 | 4 |
| 10-S: | 10 symmetrical | 5 | 5 |
| 12-S: | 12 symmetrical | 6 | 6 |

To adjust the tram line rhythm press . The correct rhythm is then set with the setting keys and . Finally the new rhythm is confirmed by pressing .

If the correct tram line has been adjusted and set to 1, the side of the field where work is to begin still has to be taken into account. With uneven and S rhythms, work can begin on either side of the field. With the even rhythms 4, 8 and 12, work must begin at the side where the closed share is, and with rhythms 6, 10 and 14 on the opposite side of the field.

In the case of the special rhythms no.15 - 29 the side of the field where work is to begin has to be decided first. "Beginning on the left" means that when starting the side of the field lies on the left hand side of the tractor in the direction of travel. Consequently "beginning on the right" is the other way round.

### 4.2.6 "+1" key


With this key the tram lines can be switched on further manually one step at a time.

### 4.2.7 "Start/Stop" key


With this key the automatic switching of the tram line rhythm can be stopped and released again.

When stopped, the arrow appears above the "Stop" symbol!

## 4.3 Description of the function keys

### 4.3.1 On/off device

Press to switch the device on. Press once more to switch it off.

Should the voltage supply drop below 9 volts, e.g. when starting the tractor, the computer switches off automatically. It can be switched on again by pressing .

### 4.3.2 "Start function"


Press the keys and to release the start function. This means that the memory for the area, time and distance is set to 0. The time is restarted automatically by pressing this key. This function is to be carried out at the beginning of each operation.

### 4.3.3 "Time" key


The operating time since carrying out the "start function" (see 4.3.2) is displayed by pressing this key. If the tractor is switched off and the computer voltage-free, the time data entry is stopped. It restarts once the device is switched on again. The clock can also be stopped during operation. After pressing press it once again to stop the clock. To restart it, press yet again.

### 4.3.4 "Area" key


The area covered since carrying out the "start function" (see 4.3.2) is displayed by pressing this key. Measurement is interrupted as soon as the computer stops receiving wheel impulses.

### 4.3.5 "Total area" key Σha

This key is used to determine the total area for a whole season. Press the Σha and C simultaneously at the beginning of the season to set the memory to 0.

### 4.3.6 "Current area output" key ha/h

This key is used to determine the current area output in ha/h.

### 4.3.7 "Distance" key km

The distance covered since carrying out the "start function" (see 4.3.2) is displayed by pressing this key.

### 4.3.8 "Speed" key km/h

When this key is pressed the current speed travelled is displayed.

## 4.4 Operation process

Once the machine data have been entered (see 4.2), the following steps have to be carried out before operation can begin. The row marker at the beginning of the field is to be operated so that the right side is lowered.

Subsequently only the start function has to be carried out (see 4.3.2).

After that, each time the end of the field is reached and the row marker is switched, tram line switching is continued automatically. Even when the computer is switched off temporarily, the last position is stored. When the computer is switched on again, the last setting is still available. Drilling can be carried on immediately.

During the operation process area, total area, operating time and distance are determined and speed and performance are displayed.

# 5 Maintenance

## 5.1 Computer

The computer is maintenance-free. During the winter it should be stored at room temperature.

## 5.2 Sensors

The sensors are maintenance-free.

# 6 Error recovery

When trouble-shooting keep to the intended sequence!

| | Error | Cause | Measures |
|---|---|---|---|
| **6.1** | **The device does not switch on** | Polarity reversal of the voltage supply | Check polarity |
| | | Voltage supply interrupted | Check battery connection cable; control battery clamps and fuse |
| | | Total failure | Send in device |
| **6.1.1** | **The computer displays HALP 00 or HALP 88** | Memory error | Send in device |
| **6.2** | **Speed is not displayed** | Impulses/100m not entered | Enter number of impulses/100m (4.2.3) |
| | | The wheel sensor is not sending any impulses to the computer, the ring in the display is not flashing during the journey. | Adjust the distance of the wheel sensor to the magnet to 5-10mm. |
| | | | The red side of the magnet must point towards the sensor. |
| | | | Secure magnet with a non-magnetic screw. |
| | | | Connect cable in the wire harness correctly<br>green = gn = signal<br>brown = br = + 12 volts<br>white = ws = 0 Volt |
| | | | Sensor is defective, replace |
| | | | Computer is defective, replace |
| | | | Wire harness is defective, replace |
| **6.3** | **The area is not displayed** | Working width not entered | Enter working width (see 4.2.2) |

# 7 Appendix

## 7.1 EMC-Supplement to the Operating Guide

### Safety notice for the subsequent installation of electrical and electronic devices and/or components

Present-day agricultural machines are equipped with electronic components and devices, whose function can be affected by electromagnetic emission from other devices. These influences can lead to endangerment for individuals when the following safety measures are not adhered to.

When subsequently installing electrical and electronic devices and/or components in a machine with a connection to the electrical system, the user must take sole responsibility for testing the installation for interference with vehicle electronics or other components. This applies in particular to the electronic controls of:

- EHR,
- front lifting gear,
- power take-off shafts,
- engine and
- gears.

Above all it must be ensured that all subsequently installed electrical and electronic components comply with the current version of the EMC directive 89/336/EWG and carry the CE symbol.

In addition the following requirements must be fulfilled when upgrading with mobile communication systems (e.g. radio, telephone):

- Only approved devices complying to national regulations (e.g. BZT approval in Germany) are to be installed;
- The device must be securely installed;
- The use of portable or mobile devices inside the vehicle is permissible only via a connection to the permanently installed outside antenna;
- The transmitting unit is to be installed in a position away from the vehicle electronics;
- An antenna should only be installed professionally ensuring that there is a good earth connection between the antenna and the vehicle chassis.

Please refer to the manufacturer's instructions for cabling and installation as well as for the maximum current consumption.

## 7.2 EC Declaration of Conformity

Unser Produkt

# DRILLMAT III

ist in Übereinstimmung mit folgenden nationalen und harmonisierten Normen im Sinne der EMV-Richtlinie 89/336/EWG hergestellt.

Angewandte Norm: EN ISO 14982

Salzkotten, 13.07.2004
(Ort und Datum)

H.Müller, Geschäftsführer

R. Buschmeier, Geschäftsführer